WHAT IS CLAIMED IS:

1. An apparatus for distributing multicast messages
associated with a multicast address among ports of a
network device on the basis of a virtual local area network
(VLAN), one or more VLANs within the network device are
assigned to the multicast address, each VLAN having a
multicast destination subset which includes one or more
destination ports assigned from the ports of the network
device, the apparatus comprising:

a means for generating a group of multicast destination
ports by collectively combining every multicast destination
subset within all of the VLANs assigned to the multicast
address on the network device; and

a plurality of translation engines respectively
associated with each port of the network device, each
translation engine independently performing a VLAN
identifier (VID) translation in parallel on each port which
belongs to the group of multicast destination ports;

wherein the group of multicast destination ports are all
of the destination ports assigned to the multicast address
on the network device.

2. The apparatus as claimed in claim 1, the apparatus
further comprises:

a lookup engine for mapping the multicast address to a
unique index value assigned to the multicast address and a
bit string representing the group of multicast destination
ports;

a forwarding engine coupled to the lookup engine, the
forwarding engine distributing the unique index value and
the multicast messages to the group of multicast

10 destination ports of the network device in accordance with

11 the bit string;

1   3. The apparatus as claimed in claim 2, wherein each

2   translation engine associated with each port translates the

3   VID from the unique index value and a VID-select index.

1   4. The apparatus as claimed in claim 2, wherein the

2   lookup engine comprises an address lookup table having a

3   plurality of entries each of which comprises the multicast

4   address, the unique index value, and the bit string.

1   5. The apparatus as claimed in claim 2, wherein the bit

2   string functions as a port mask, wherein each bit of the

3   port mask corresponds to a specific port of the network

4   device, and wherein the multicast messages are forwarded to

5   the group of destination ports of the network device in

6   accordance with the port mask.

1   6. The apparatus as claimed in claim 2, wherein each

2   translation engine comprises:

3   a VID tag list corresponding to each port of the network

4   device; and

5   a VID-select table containing a plurality of VID-select

6   bitmap each of which corresponds to the unique index value,

7   wherein each VID-select bitmap functions as a selection

8   mask for the corresponding port, wherein each active bit of

9   the selection mask is indicative of the VID-select index

10 for each port of the network device, and wherein the VID-

11 select index selects the corresponding VID associated with

12 the multicast address from the VID tag list.

1   7. The apparatus as claimed in claim 6, wherein every
2 VID-select index is respectively fetched from the VID-
3 select bitmap corresponding to the unique index value on
4 each port of the network device.

1   8. The apparatus as claimed in claim 2, wherein the
2 lookup engine further comprises means for performing link
3 aggregation complied with the 802.3ad standard.

1   9. A method of distributing multicast messages
2 associated with a multicast address among ports of a
3 network device on the basis of virtual local area network
4 (VLAN), one or more VLANs within the network device are
5 assigned to the multicast address, each VLAN having a
6 multicast destination subset which consists of one or more
7 destination ports assigned from the ports of the network
8 device, the method comprising the steps of:
9   A. providing a group of multicast destination ports, a
10 unique index value, one or more VID-select indices assigned
11 to each destination port, and a plurality of VLAN
12 identifier (VID) tag lists respectively associated with
13 each port of the network device;
14   B. looking up the group of multicast destination ports
15 and the unique index value assigned to the multicast
16 address in an address lookup table;
17   C. forwarding the multicast messages to the group of
18 multicast destination ports of the network device; and
19   D. translating one or more VLAN identifiers (VIDs) on
20 each port in parallel and independently from the unique
21 index value, one or more VID-select indices and the VID tag
22 list corresponding to each port of the network device;

23   wherein the group of multicast destination ports are all

24 of the destination ports assigned to the multicast address

25 on the network device;

26   wherein the unique index value is assigned to the

27 multicast address;

28   wherein the VID-select indices are associated with the

29 unique index value.

1   10. The method as claimed in claim 9, wherein the step A

2 comprises the steps of:

3   A1. generating the group of multicast destination ports

4 assigned to the multicast address by collectively combining

5 every multicast destination subset within all of the VLANs

6 assigned to the multicast address on the network device;

7   A2. storing the group of multicast destination ports,

8 the unique index value, and the multicast address in one of

9 a plurality of entries of the address lookup table, wherein

10 the group of multicast destination ports are stored in a

11 bit string of the entry; and

12   A3. storing the VID-select indices in one of a plurality

13 of VID-select bitmap of a VID-select bitmap table.

1   11. The method as claimed in claim 10, wherein the steps

2 A1~A3 are performed in response to the Internet Group

3 Management Protocol (IGMP) service request.

1   12. The method as claimed in claim 10, wherein the step

2 D comprises the steps of:

3   D1. selecting the VID-select bitmap corresponding to the

4 unique index value from the VID-select bitmap table;

5   D2. fetching one of the VID-select indices from the VID-

6 select bitmap independently on each port of the network

7 device;

8   D3. fetching the VID associated with the multicast
9   address independently on each port of the network device,
10 according to the VID-select index from step D2 and the VID
11 tag list corresponding to each port;
12 D4. repeating step D2 and D3 until each port of the
13 network device examines all of bits of the VID-select
14 bitmap.

1   13. The method as claimed in claim 9 further comprising
2   the step of:
3   E. tagging the related VID on the outgoing multicast
4   messages independently on every destination port of the
5   network device.

1   14. The method as claimed in claim 9, wherein the step B
2   further comprises the step of performing link aggregation
3   complied with the 802.3ad standard.